Astronomical Conversation

Between

a Lover of Astronomy

and

Several Renowned Astronomers of the New Age,

Wherein Clear Information Is Given

Concerning the

Infallibility of the Copernican Solar System

By

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> “Holding themselves to be wise,
> they became fools.” Rom. 1:22

Astronomical Conversation

According to the conception of the ancients, the earth stands still and firm in the middle of the universe. Around it the sun and moon move from east to west in orbits similar to circles. The planets run either all around the sun and with it around the earth, or a part of them moves only around the earth, similar to the sun and moon. And sun, moon, and planets move together with the innumerable army of the fixed stars around the earth in a twenty-four-hour span.

So thought the ancients of the order of the universe; so it is confirmed by the primary source of *visual appearance*, daily experience; *so speaks also Holy Scripture of this majestic phenomenon!*

Copernicus, and with him almost all the newer astronomers, asserts the opposite: the earth moves around the sun just like the planets; the earth is itself only a planet and nowhere near the main body of the mundane world. And this those of this age who are knowledgeable about the stars assert with a certainty, this they want to have investigated, calculated, and proved so precisely that they concede no kind of authorization to the opposite opinion, yes, they mock and ridicule their representatives.

Who now is right? — It would not matter to me who is right if it were only a matter of human opinions. But the wise and true God Himself has spoken about this matter in the Bible! The outlook underlying all of Holy Scripture is that the earth is the main body of the universe, that it stands firm, and sun and moon only serve to light it!

What should I think of this testimony of my God? —

Not only learned but also Christian men come and say, “One cannot learn such things from Scripture; it certainly shows us the way of salvation, but it does not teach us to know the world!” Still others say, “In matters concerning nature and its laws, the Bible only speaks the opinion of the human authors, which they could have according to the standpoint of science at that time!”

If this is true, then not all the words of Scripture are given by the Holy Spirit; then my reason must first separate what is of God and what is of men; then I am never sure whether I have God's, whether I have men's word; then I must probably even assume that error is found in God's mouth when He speaks to men — to His Church — of the visible world, of nature and its laws! then my God also forsakes me when I ask for truth.

Because it is a matter of the truth of Holy Scripture, that is why the above question is of the greatest importance to me!

But nobody understand me now in such a way, as if I wanted to *investigate* first where the truth is to be found: in the Bible, or with the astronomers. No, I know this beforehand, ***that my God never lies, never errs***. So also only truth comes from His mouth when He speaks of the universe, of the earth, of sun, moon, and stars.

But this I might ask and want to ask: *what reasons do the astronomers have for their assertion? What proof have they provided for it and submitted to the world, that **only they** can be right, **but experience and Bible must be deceptive***? And I do not ask this only for my sake; but I ask it out of the hearts of many moved by doubt — with whom the high regard for the newer astronomy fights with the trust in God's Word —, who do not quite know where they should turn! — Alas, it is indeed unfortunately all too true that the "science" overall, that the present-day "astronomy" especially, has blinded the eyes of many in such a way that they do not see the bright light of the divine Word, that they hold it to be a mere dimly burning torch. The glory cry that the enemies of the Bible raise for their "science" — the disdain with which the intelligent men of this world handle the holy Word of God has made them insane, so that they support themselves on the wretched cane: God teaches only the order of salvation, but not the order of the world!

To these, not to the mockers and carnal, I think to do a service when I raise the question: *With what do the followers of the Copernican system prove the truth of their assertion? With what authority and right do they cry out against the Bible?*

II

But where is the answer to be found? One does not find it in the usual school textbooks of geography, world studies, physics, etc. There may well be assertions in them; but one looks around in vain for real proofs. *These proofs must be able to be found in the books of the proper astronomers in any case*, if they are to be found at all! So I thought and, for this reason, acquired three *astronomical works*, in order to get to know from them the reasons which prompt and entitle our experts of the stars to appear so certain of victory with their opinion, to discard the worldview of the Bible so despicably.

These works are as follows:

Populäre Vorlesungen über wissenschaftliche Gegenstände by *F. M. Bessel*. Hamburg, 1848. (The book contains 15 lectures, 10 of which concern astronomy and its results.

Die Wunder des Himmels oder gemeinfassliche Darstellung des Weltsystems. By *J. J. von Littrow*. Fourth Edition. Edited according to the latest advances in science by *Karl von Littrow*. Stuttgart, 1854.

Der Wunderbau des Weltalls oder *Populäre Astronomie*, by Dr. *J. H. v. Mädler*. 6th Edition. Berlin, 1867.

Still some from the following book belonging to a colleague:

Lehrbuch der kosmichen Physik. By Dr. *Joh. Müller*. Braunschweig, 1865. (This work contains an astronomical section, comprising 202 pages.)

What I found in these books *concerning the certainty of the Copernican system* is communicated in the following. I had to omit everything for whose understanding and assessment more exact mathematical skills, calculations, and drawings are necessary; likewise, much that would have served only to provoke laughter. But more than enough has been found to be able to answer the question raised!

With very few, minor exceptions, I always quote the words of those authors, *all four of whom are decided Copernicans*, verbatim. For the sake of better understanding and to establish some degree of a relation, I have brought the whole thing into conversational form, and here and there I have also let my judgment flow in, or added a note.

The well-disposed reader now should want to carefully note what these astronomers of the subject state, and then he should want to judge for himself whether a Christian has cause to doubt the truth of his Bible, and also whether the motto[1] was chosen rightly or not!

May the Lord bless even this insignificant testimony in order to strengthen the firm trust in His Word!

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[1] [Translator: This is a reference to the motto of the *Lutheraner*: *Gottes Wort und Luthers Lehr' vergehet nun und Nimmermehr*.]

Astronomical Conversation

1. What actually is the goal of astronomy or studying the stars?

"Astronomy has the goal to teach to know everything that can be known to us of the motions and the state of the heavenly bodies, including the terrestrial body [the earth]." (Bessel, 505)

2. Surely astronomy has now flourished to the point of perfection?

"The *history of the human race* so far offers us four periods, the limits of which, however, have not been recognized by historians. *The degrees of progress in the understanding of the book of nature* determine these boundaries. — The particular period we call "before the flood" is the one in which the human race learned to walk and played children's games without troubling itself about the book of nature. (!) The Psalms of David and the songs of Homer fall into the second period, in which one became acquainted with his letters, but did not suspect that their composition could have a meaning. The third period is that of the spelling of words; it starts *after* Homer, for his songs still show the most wonderful conceptions of the earth, *different* than would have had to be present if one could have interpreted even just *a single line* of the book of nature. The fourth period is that of reading: it starts from *Newton*, and in the short time of 150 years we can have read only a small part of what is to be read. Whether it will be followed by another fifth period, we do not judge: it would have to make true that which often, but without reason, has been said, that nature *serves* men." (Bessel, 39–40)

3. They therefore reckon Copernicus and Kepler still in the period of the spelling of words! Indeed, that is remarkable to me! Sir Littrow, are you of the same opinion?

"Copernicus[2] gave us the *new testament of astronomy*, and Kepler[3] provided us a new, significantly improved, edition of the same." (Littrow, 544)

4. What advantages does the Copernican system have over the old Ptolemaic system?[4]

"The *Ptolemaic* system is made up of formless pieces and is extremely composite; whereas the *Copernican* system appears in the highest degree *simple and symmetrical*, so that one must immediately recognize it as the *only* true one." (Littrow, 145)

5. Is then the orbit of a planet, e.g., that of Jupiter, an exact and regular one according to the new system?

"Whereas Jupiter is guided by the mere influence of the sun in an ellipse of more than 650 million German miles around the same, all the other planets surrounding it perpetually seek to pull it out of this orbit. According to the different positions of these planets, one draws Jupiter closer to the sun, while another moves Jupiter away from it; this one drags Jupiter on its path, that one drags it back; this one raises it above, that one pushes it under its initial orbit; and it is easy to foresee that all these constantly working disturbances change not only the point of the planet in its orbit, but in the end also this orbit itself, that they will have their influence also on the size, shape, and position of this orbit, and that hence the planet, given all these forces always disturbing each other, will actually describe in every instant another, a completely new crooked line around the sun." (Littrow, 5)

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[2] *Nicolaus Copernicus*, born in 1473 in Thorn in West Prussia, studied theology, medicine, and mathematics. He became a canon in Frauenberg, began astronomical investigations in 1506, and later appeared with the assertion that the earth moves around the sun. He died in 1544, after he had received the first copy of his printed works while still on his deathbed.

[3] *Johannes Kepler*, born in 1571, first studied theology, then turned to mathematics and became *Tycho Brahe*'s assistant in Prague. After Brahe's death he inherited his astronomical writings and derived from them three laws according to which the heavenly bodies should move. He died in 1630.

[4] *Claudius Ptolemy*, a renowned Egyptian astronomer, died around 250 A.D., taught that the earth stands in the middle of the universe and the moon, sun, Mars, Jupiter, and Saturn revolved around it. He let Mercury and Venus run around the sun, whose orbits then formed so-called wheel lines or epicycles.

6. Now I find such an orbit neither simple nor symmetrical! But the orbit of the moon is nevertheless surely quite simple according to the Copernican system?

"Each day the earth covers over 355,000 (German) miles around the sun, thus flying through celestial space at a speed that cannot be compared further with that of our cannonballs; and the moon accompanies it on its path by always dancing around it in large spirals or serpentines and *changing its speed every instant*. While the earth annually goes around the sun in a simple ellipse, its companion runs around the earth at a distance of 51,800 (German) miles in the same period 12⅓ times, so that its true motion resembles a string looped together from 12 to 13 knots, but it is so wonderfully convoluted that it does not collapse into itself." (Littrow, 355–356)

7. Aha! I had not thought of it like that! And that is therefore "simple and symmetrical." But perhaps I comprehend it still better. Can all phenomena in the heavens then be explained according to the Copernican system?

"It has already been mentioned that the Copernican system not only explained *simply and completely* that which was available as a task at the time of its originator, but that also all perceptions and discoveries made later, of which one then neither suspected nor could suspect anything, *can be shown from it just as unceremoniously and logically consequent*." (Mädler, 61)

8. Is this also your opinion, Sir Littrow?

“We are not yet acquainted with all the details of the planetary movements — *since the Copernican system*, its great, undeniable merits notwithstanding, *is still not actually the true system of nature*, but still needs a very important improvement as an addition.” (Littrow, 153)

9. Don’t the present-day astronomers calculate according to the Copernican system?

“Copernicus had, by the exhibition of his planetary system, forever destroyed the doctrines of the rest of the earth at the center of the world, which since the most ancient times had been generally assumed and, as it were, sanctified, and had thus cleared away the great obstacle that had hitherto made our true knowledge of the heavens and *made all actual progress in science impossible.* He was thus the founder or — much better — the initiator of the newer astronomy, but without also being the father of it at the same time, although he has been called so often enough. *For our current system is not the Copernican system,* just as its inventor himself has shown us in his work. *It is rather very different therefrom, and this difference does not consist in small improvements and additions,* but in very *essential changes* which, if he were to come back now, would make his own *system* itself unrecognizable to him; although, having said that, the most excellent idea, that of the daily movement of the earth around itself and the annual movement around the sun, *but really nothing else*, likewise underlies the new system.” (Littrow, 156)

10. Sir Mädler, how do you judge the importance of the Copernican system?

“All brilliant discoveries only became possible owing to the secure foundation which Copernicus had laid; they could not emerge from systems which, sticking to appearances or adhering to traditional old prejudices, did not satisfy the needs of the inquiring mind; *they are incompatible with every other system than the Copernican one, with which, moreover, the entirety of astronomy stands and falls*, and without which we *must completely renounce* every explanation, as well as every scientifically founded predetermination.” (Mädler, 53)

11. Can the phenomena in the heavens also be explained if one assumes that the whole firmament rotates daily around the stationary earth?

“This explanation of the observed daily movement of the stars by a rotation of the heavens around a fixed arc is so simple, and the matter itself so appropriate, that it can be seen as an immediate description of the phenomenon itself or, as it were, as only another expression of the same. *Also, all individual circumstances of the whole phenomenon are thereby shown so exactly that one can doubt the correctness of the explanation itself no further.*” (Littrow, 37)

12. According to the older planetary systems, how did one try to explain the fact that the planets occasionally appear retrograde?

“In the three older planetary systems (the Ptolemaic, Egyptian, and Tychonian systems), one tried to explain the second inequality (the backward, retrograde movement) by the theory of *epicycles*, in which one supposed that the planets move in circles with uniform speed, whose centers themselves again describe a circle around a fixed or movable center.” (Müller, 126)

13. Can the movement of the planets be explained in this way?

“This indeed entirely ingenious theory explains in this way all the strange irregularities, which we already became acquainted with. — It seems likely that the standstill and the retrograde movement in general can be explained quite well in this way, if one puts in the place of the simple circles — such epicycloids (wheel lines with loops) of corresponding shape.” (Müller, 126–127)

14. Did also Copernicus calculate according to such epicycles?

“Even Copernicus was forced to keep epicycles.”[5] (Littrow, 544)

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[5] Also, the current astronomy cannot be finished without epicycles. The orbits of all minor planets can be explained even now only by epicycles. (L.)

15. Then which of the two hypotheses is more excellent: that the earth is fixed, or that the sun is fixed?

"*Both hypotheses represent the phenomenon, which should be explained thereby, equally well and completely*, and as long as it is merely to do with this representation of the outward appearance, the choice between the two depends only on our arbitrariness, *since none of them has precedence over the other, and there is nothing in them that could lead us to the acceptance of one or the other preferentially.*" (Littrow, 39, 80)

16. What, then, leads you to decide on the movement of the earth?

"That is the 'inner probabilities'"! (Littrow, 39)

17. If I understand correctly, *Newton*[6] first rightly justified the Copernican system. What is it, then, that he actually announced to the world?

"The new doctrine given by Newton consists in this, *that all bodies*, in heaven as on earth, *attract each other*." (Bessel, 9)

18. How did Newton discover the law of gravity, according to which all heavenly bodies should attract each other?

"It is reported that in 1666, when he had left Cambridge because of the plague, sitting in a garden, *he saw an apple fall from the tree* and submitted to himself the question: what is it that drives the apple to the earth? And in further pursuit of this thought he had come upon the law of gravity." (Mädler, 669; Littrow, 546)

19. By which observations did Newton find the flattening of the earth?

"Newton had for reasons — *concluded* that in the case of it moving around its axis, *the equilibrium of the earth can exist only* if the polar axis is not lengthened, but rather shortened"! (Mädler, 21)

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[6] *Isaac Newton* was born in England in 1652 and died in 1727, whereupon he was buried with royal honors. Optical experiments and mathematical investigations formed his main occupation.

20. By which observations did Newton actually come to his remaining discoveries?

"For all that, Newton himself knew to answer the inquiry of his friend *Halley*, in which way he had come to his great discoveries, only with the few, but content-heavy words: *By thinking about it incessantly*."[7] (Littrow, 545)

21. Therefore not observation and exploration of the real laws of nature, but mere speculation led Newton to his assertion! No man can think up the laws of the universe; they must be researched through strenuous observation![8] As it seems, the astronomers nevertheless take Newton for a very great man?

"Whoever is able to grasp it completely will admit that the well-known

'God said, Let there be light!
Then Newton came, and there was light'

indeed does not say too much." (Mädler, 670)

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[7] "When Newton therefore dealt with the question, whether matter inherently has a force of attraction, from which the phenomena of the heavenly motions immediately follows, he decides this not by really investigating for such a force of attraction in nature, but by issuing his *laws of gravity* by a simple abstract definition. A general force of attraction of the earth was not proved *factually* or by facts; no, a law of its *effect* (gravity) was drafted, and when this was sound, i.e., *calculated*, the thing itself was thereby proved according to Newton's assertion." (*Richer's Letters Concerning Gravity*, p. 15)

[8] *Leibniz*, the renowned philosopher, wrote to Conti in 1715: "I am a great friend of experimental physics, but Newton deviates much therefrom when he asserts that every matter is heavy, i.e., that every particle of the earth's matter *attracts*." (*Richer's Letters*, p. 27)

"*Newton,*" Lagrange says, "was not only the *greatest* of all scholars, but also the *most fortunate*, for there is only one universal law of the world to discover."[9] (Mädler, 670)

22. Therefore the world sat in darkness for almost 6000 years; only since Newton's new teachings has light come to the sciences! I am certain that more true astronomy is taught on the first page of the Bible than Newton knew! What you say of him is an idolatrous worship of the man. But let's leave that right now. — Does the Newtonian law of attraction then explain all motions in the heavens?

"*Laplace*[10] has repeatedly pronounced the *Newtonian law of attraction* to be sufficient to explain all motions in the heavens. It really explained many things; — — *only, in my opinion the proof that the theory based on this law completely explains all observations, has not really been supplied*; and yet only by this proof can we maintain the conviction that no other cause contributes to the movement." (Bessel, 20)

23. Then according to this law, do the planets always move with the same speed?

"The movement is strongest when the planet is situated closest to the sun; from here on it becomes weaker and weaker and obtains its smallest limit at the greatest distance to which the planet can come; but then it increases again until it once again obtains its former value near the sun." (Bessel, 99)

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[9] The atheist *Mirabeau*, one of the greatest heroes of the revolution in France at the end of the previous [18th] century, triumphantly declares himself in favor of the doctrine that the atoms (or smallest specks of dust, from which everything is supposed to have come) form themselves, and he laughed at the "trajectory" that "an almighty creative force" is active in the formation of the world. (Morrison, 8)

[10] A French scholar, born in 1749, died in 1827. He was of pious and faithful mind in his youth; in his later age he denied God and ridiculed everything sacred. Especially *Kepler* was therefore to him a truly "saddening" phenomenon, because he confessed faith in a living God. (Richer, p. 9) Yes, he even mocked *Newton*, because he believed in the effects of a higher "intelligent Being." (Morrison, p. 8)

24. And that's what the force of attraction should bring about!? Oh, how wonderful: The sun attracts the planets the strongest when they are the furthest!! You astronomers are masters of a thousand arts![11] — But can the orbits of the planets then be explained according to the Keplerian laws?

"If one considers the sun *alone* to be attractive — then one gets the Keplerian laws. But since not only the sun attracts, but also the planets are bodies, and because attraction is a property of *bodies*, therefore the planets also attract. The earth, for example, is not only subject to the attraction of the sun alone, but the attractions of Jupiter, of Saturn, in short *all* remaining heavenly bodies. The immediate consequence of this is that the earth *cannot move* as it would if it were exposed to the attraction of the sun alone, *hence also not according to the Keplerian laws*, in that they are a consequence of the exclusive consideration of the attraction of the sun. *The* ***true*** *movement of the earth, and likewise the true movement of every other heavenly body, must therefore deviate more or less from the movement which the Keplerian laws alone prescribe.*" (Bessel, 110)

25. But Kepler obviously deduced his laws from the movement of the planets, so how can this now at the same time deviate from his laws?

"The contradiction is apparent. However, we do not want to consider ourselves lost yet, but to try to fight our way through."

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[11] [Translator: Cf. this statement from Luther's *Large Catechism*: "And what need is there of many words? If I were to recount all the profit and fruit which God's Word produces, whence would I get enough paper and time? The devil is called the master of a thousand arts. But what shall we call God's Word, which drives away and brings to naught this master of a thousand arts with all his arts and power? It must indeed be the master of more than a hundred thousand arts."]

26. I am eager to see how you will succeed in this!

“Only one line of retreat is at hand, namely, the deviations of the movement of the planets must be so small that the observations of *Tycho of Brahe,*[12] which Kepler based his investigations on, could not reveal them. If this really takes place, then we are saved, because it now becomes clear how *Kepler could and even had to confuse* something *that is only an approximation of the movement of the planets with the movement itself.* — — It will suffice to mention here that the forces with which the planets attract are found, without comparison, much smaller than the powerful attraction of the sun, so that even Jupiter, which is by far strongest among the planets, does not yet express the thousandth part of the power of the sun. — — We have brilliantly completed our retreat. (Bessel, 111–112)

27. You have certainly completed it, Sir Bessel; but in my opinion not to the honor of astronomy. For if Kepler’s *laws* are based on a ***confusion*** *of the true movement of the planets with an approximation of them*, they have no value at all. — That being said, is the mutual attraction of the planets always equally strong?

“The smaller the distance is, the greater the attraction becomes!” (Bessel, 113)

28. Aha! The sun attracts the least when the planets are closest to it; but the planets attract the strongest when they are closest to each other. Indeed, a wonderful force of attraction! Again: You astronomers are masters of a thousand arts![13] — Now, have the astronomers measured the distances of the world bodies exactly?

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[12] *Tycho de Brahe* was a Danish nobleman and was born on December 14, 1546. According to the will of his family he should have studied law; but he turned to astronomy and so excelled in it that he is called the “king among astronomers.” He taught that the earth stands still and the sun moves around it. He died in 1601.

[13] See n. 11.

"One may certainly say that the astronomers know the paths in the heavens better than our geographers on earth." (Littrow, 94)

29. Then are the astronomical observations completely exact?

"The initially very crude observations have currently achieved a truly admirable degree of accuracy. But the universal nature of all observations, namely *to be approximations of the truth*, they have neither lost, nor will they ever lose it. It follows from this that astronomy *can only approach more and more, but never reach*, its goal, which is the perfect knowledge of the movement of the heavenly bodies." (Bessel, 18–19)

30. But, my much-honored Sir Bessel, *are then the observations of the planets made for many years so processed into a whole that one knows their orbits and their theory with complete certainty*?

"The observations of the sun and the planets, which have been made since 1750," are not yet processed exactly (they still resemble "the numb rock and poor ore"). "Only *Flemming* has processed the observations of Uranus. Their results must now soon show whether they are already a sufficiently firm foundation of further clarifications, or whether another century must strengthen them by its observations. — When we will have similar things from all planets, *only then will we know exactly the solar system's state of astronomy*; we will then have the means, *if the general theory is sufficient (!)*, to adjust the particular theories of all planets to the facts at hand; if it is not, to evince its defects; we will have opened a track on which, progressing, astronomy must approach more and more its ultimate goal. — — This labor alone has appeared to all who have concerned themselves with the theory of the planets much too great to be fully realized; they have had to realize a small part of it, *so as to also never be able to take it so consequently and exactly, as would have surely been necessary to come to know the complete and undistorted witness of the observations. The inevitable consequence of this is that one really* ***goes too far when one speaks of a report of the observations****; no one can specify what it actually consists of.*" (Bessel, 451–453)

31. My lords, I am astonished to the uttermost to hear this from your mouth! Soon you talk as if you knew everything most certainly; soon you confess that many things, namely the main things, are still uncertain! But perhaps the certainty will be found later. Allow me to ask some more questions.

You assert that the sun stands still and the earth moves around it. But if the earth runs around the sun once every year, and is about 20 million miles away from it, then must not the stars appear to us in different directions on December 21 than on June 21?

"If the earth indeed moves every year in a circle whose radius is equal to its distance from the sun, or 20,680,000 (German) miles, then we will be located on this world ship of ours at the end of each half year at a position in the heavens that is more than 41 million (German) miles away from the point where the earth was at the beginning of that semester; and such an enormous distance will without a doubt express a very clear influence on the stars visible from these two positions of the earth and their location in the heavens." — — — "So this path may indeed be called enormous. And at both endpoints of such an incalculable, almost incomprehensible road — what changes will the starry sky and all objects scattered on both sides of this road in the world spaces suffer? Stars that are close together here because they are so far away from us, will be far apart where we have come 41 million miles closer to them; and vice versa: stars that were initially far away from each other will move very close to each other; such stars, which appear large to us here, will hardly be seen anymore there, and for them appear others large and bright, which we could not yet see here; all the stars will be changed, all the constellations will shift in shape, and the whole sky will be another. *All of this can however be expected with the greatest probability for such a tremendous change in our stance*. (Littrow, 96–97)

32. And you, Sir Bessel, what do you say to this view of your honored colleague?

“Since the earth over the course of a year runs through all the points of its orbit, all visual lines laid by it over this period to a *point not moved with it* must intersect in this (point), thus must also assume gradually different directions; or, in other words, the point must continually change its directions, and, over the course of the year, appear to run through an orbit on the celestial sphere. *Thus also the fixed stars* ***must*** *show these apparent motions and thereby change their mutual positions*; they *must* show them the larger, the closer, and the smaller, the farther they are; and from the size in which they show them, their distance must be apparent.” (Bessel, 209 — This mutual position of the fixed stars is called the *stellar parallax*.)

33. Might I also ask you for your opinion, Sir Mädler?

“The finding of the stellar parallax would have irrefutably proved it, as it were, with one blow” (namely that the earth moves around the sun); “if, on the contrary, it was proved that the fixed stars have no parallax at all, then it was also nothing with the movement of the earth around the sun.” (Mädler, 464)

34. Dr. Müller, would you kindly articulate your opinion?

“If the teaching of Copernicus is correct, that the earth like the other planets orbits the sun, and that the apparent motion of the sun at the firmament is only a consequence of the true motion of the earth, then also the fixed stars must show an apparent motion stemming from the earth’s change of location and thereby change their mutual positions. But these apparent motions of the fixed stars, which according to their origin must be bound to an annual period, will be the smaller, the further the fixed stars are away from us.” (Müller, 238)

35. Then the astronomers must surely have made a zealous effort to find and prove this parallax?

“When Copernicus appeared with his new world system, one still noticed no trace of an annual parallax of fixed stars; their mutual position was considered absolutely unchanging, and the followers of the old system did not fail to assert this circumstance against Copernicus, who could oppose these objections with nothing but that the distance of the fixed stars was so great that the annual parallax had a vanishingly small value for the degree of accuracy of astronomical measurements achievable at the time. — From now on, the zealous efforts of the astronomers were directed on improving the accuracy of observation as much as possible, in order to ascertain the annual parallax of some fixed stars and not only to thereby prove the correctness of the Copernican system, but also to determine the distances of these fixed stars." (Müller, 239)

36. Sir Littrow, what do you say to this utterance of Dr. Müller?

"The astronomers since Copernicus, i.e., since this movement of the earth was known to them, have endeavored to discover these wonderful changes of the heavens and to raise them above all doubt by their observations." (Littrow, 97)

37. You falter, my lord! Please, proceed! What changes have the astronomers found?

"And what changes did they find until about ten years ago? — **None at all!** Their best telescopes, their most complete instruments, the combined works of the most distinguished observers for centuries — everything was for nothing; those changes expected with so much certainty did not exist, and the incalculable host of stars surrounding us showed *the same sight* throughout; one might consider it at the beginning or at the end of the 41-million-mile-long path." (Littrow, 97)

38. Sir Mädler, you are familiar with the latest research. How do you judge this matter?

"In the proper sense the fixed stars could never again be *infinitely* far, and of the correctness of the Copernican system nobody only moderately familiar with astronomy had already been doubtful for more than one century. And now for the first time (!) this hope should *not* be vain. Almost simultaneously (1836), at three different points and by three different methods of observation, the real parallaxes of three stars were found and, by further continued observations, fixed within such narrow limits that the problem must be considered solved. *The severity* *of the theoretical investigation leaves no room for doubt* that what was found could be anything other than the parallax." (!) (Mädler, 467)

39. Would you not have the kindness to tell me some particulars about it?

My colleague "Bessel has with the great Königsberg heliometer compared Star 61 in the Swan with two very weak adjacent stars and determined their distance and mutual direction angles. The result for the parallax from all comparisons was an average of 3,483 ten-thousandths of a second, which leads to a distance of 592,200 earth distances (11½ billion miles) and a *time of light* (to approach the earth from there) of 9 years, 3 months." (!) (Mädler, 467)

40. And how, Sir Mädler, do you judge the accuracy of Bessel's calculation when you compare it with other observations?

It is "the *most certainly determined*!" (Mädler, 469)

41. Sir Bessel, how do you yourself judge the result of your observations?

"Clear *traces* of the annual parallax were present; — — — *but I am by no means inclined to trust them with such great certainty that I would like to consider this result indubitable.*" (Bessel, 257)[14]

42. Ha ha! So it stands thus. However, Sir Mädler, perhaps you know of other, entirely exact and infallible observations. Please, share them!

"Struve tested — — Star α in Lyra. — His first appointed series of observations in 1836 gave him 125 thousandths of a second; the later continuation of them, when everything was compiled, 2613 ten-thousandths of a second. This led to a distance of 789,400 earth distances and a time of light of 12 years, 1 month. Struve believes this result to be assured up to approximately one year. The later observations continued in Pulkova, put together with the earlier ones, bring the parallax of α Lyra up to 153 thousandths of a second; Peters has obtained — 108 thousandths of a second. — Peters has by *extremely exact* and numerous observations of the polar star — determined its polar axis to 76 thousandths of a second, a statement that necessarily includes *fairly considerable uncertainty* (a time of light of 43 years, *with an uncertainty of approximately 7 years*)." — — — "Other works related to parallaxes have only shown a star of the 7th magnitude in Canes Venatici; *the deviations alone of the different observers among themselves are so great* ***that we here can still speak of no determined result***." (Mädler, 468–469)

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[14] In Dr. Müller's *kosmische Physik*, p. 242, it is claimed that the annual parallax is found from thirty-three stars. "Five stars" at which it is "greatest" are then cited as examples. Among these five is also the star that Bessel observed for over a year to find its parallax. Bessel *himself* judges the result, as it is read above; with Müller, everything is already "determined." By this, one also notices how it stands with the astronomical certainties.

43. So I notice well that the astronomers have not yet found the parallax, which however must be present, according to their assertion, if the earth is to move around the sun! But how do you explain the course of the earth around the sun, since you cannot prove that parallax indubitably?

"And what is one to conclude from the failure of all these works? One of the two: either it is not true that the earth moves around the sun, and then those mere dreamed changes of the stars of the heavens fall away by themselves; or else, the distance of these fixed stars from us is so enormous that even that distance of 41 million miles only vanishes like an unnoticeable point against that distance." (Littrow, 97)

44. But do you actually know for sure that one part of the fixed stars are further away from us than others?

"*Completely lacks an unmistakable reason to consider the one fixed star closer than the other*." (Littrow, 249)

45. Then you must admit that you can certainly therefore expect no parallax with certainty! — The fixed stars probably appear quite large through good telescopes?

"The fixed stars appear *smaller and smaller, more and more as actual points*, the more perfect the telescope through which they are viewed is." (Littrow, 99)

"I have already said above that all fixed stars appear in good telescopes only as *individual points without all dimensions*." (Littrow, 458)

46. Indeed, that surprises me! I had expected the opposite! Sir Mädler, do you testify to the same?

"If one looks at the sky with sufficiently strong field glasses, diameters will soon show up with the older planets; *on the other hand, the fixed stars even in the strongest magnification always remain points* that are distinguished only by stronger or weaker shine, as well as to some extent by color." (Mädler, 418)

47. But aren't the fixed stars assumed to be very large because they can be seen from far away?

"Even a very small, one- or two-inch mirror" (placed so that it reflects the sunlight it catches back into the viewer's eye) "appears vividly brilliant, visible even to the naked eye, as a distance of 5 or 6 (German) miles; but with telescopes it is seen at the *very farthest distances, and there is no limit to it* but that caused by the intervening of the curvature of the earth, over which one can no longer look as the distance grows ever greater." (Bessel, 65, 68)

48. Then do you know something certain about the size of the fixed stars?

"Their true *size* is unfathomable to us, likewise their distance (if one excludes a few whose distance from our sun has been roughly determined in recent times[15])." (Mädler, 420)

49. Is this also your opinion, Sir Littrow?

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[15] Mädler means here those fixed stars, whose annual parallax one wants to have found. Cf. Q. 39, 42.

"Concerning the distance and therefore also concerning the absolute size of the fixed stars, we still know very little. We do not know a single one of them of which we can say that it exceeds our sun in size, even only in round number, a hundred or thousand or even million times. Also, if we look at the apparently *largest* of these fixed stars through our telescopes, we see them *only as indivisible, namely the smaller, purer points, without any noticeable diameter*, the better the telescope we use for this purpose is. — If we therefore still want to speak of the *size* of these fixed stars, then this can only be intended of the *apparent size*, of the greater or lesser impression, which their luminous intensity produces on our eye." (Littrow, 448)

50. And you, Sir Bessel, what do you think about the size of the fixed stars?

"The *size* of the fixed stars — is not to refer the diameters under which they appear, still less to their bodies. Hence, the *size* of a fixed star is to be understood as the designation of its brightness." (Bessel, 594–595)

51. But can one nevertheless find calculations about the size of the fixed stars and their distances?

It is necessary "*to hazard arbitrary premises* and see what consequences they would have." (Littrow, 458)

52. So it is nothing at all with all those assertions that the stars are suns and of enormous size! — But I have heard that one can calculate the distance of the fixed stars according to the time which the light needs to come from them to us. Sir Littrow, how is it now?

"Light, whose speed is the greatest we know in nature, covers the path from the sun to the earth (20 million German miles) in 8 minutes and 13 seconds; its speed is thus 38 million times greater than that of that ship, and yet, in order to reach us from that fixed star, it would spend more than 3 full years on its way. — And this applies only to the *nearest* fixed star. The others may perhaps be still many thousands of times further away from us; yes, it is not only possible, but even *probable* that there are fixed stars from which the light, its speed bordering on the appalling notwithstanding, *reaches us only in millennia*, so that at the time of our *Moses* or *Alexander* total changes in the heavens may have come to pass of which we, who still see it unchanged, have no tidings, because the messenger who is to bring them to us, because the light has not had time since then to reach us from that space." (Littrow, 99)

53. But, Sir Mädler, what do you say to such utterances of your colleagues?

"The speed of light is a *finite* one; from the beginning of creation until our days a *finite* time has passed; and we can therefore perceive the heavenly bodies only *up to the distance which the light goes through in that finite time*. Since the dark sky explains itself sufficiently in this way, yes, presents itself as necessary, then also the coercion to carry out a light swallowing falls away. Instead of saying the light *no longer* reaches us from those distances, one must say: *it has* ***not yet*** *reached us*!" (Mädler, 475)

54. Ah! My lord, you therefore know of stars whose light no human eye has yet seen! And you call this science?! — According to your assertion, the stars that Adam saw must certainly have been created a long time before him?

"We know very well that the data (specifications) we here refer to have no claim to arithmetic accuracy, and that the future will have to correct very significant defects. But these modifications (changes) science will *always* owe *only to itself*, i.e., to more exact observation and the sharper and the more deeply penetrating theory: ***science*** *can never let itself be mislead even in the slightest by* ***alleged*** *historical testimonies about the age of the world bodies,* ***as every unbiased person probably realizes by himself***." (Mädler, 463)

55. You astronomers thus reject from the beginning every historical testimony, also that of Holy Scripture, which is against your opinions and speculations! This is certainly significant! And every "unbiased

person" should recognize this immediately! Well, I do not recognize it and I consider your judgment to be a presumption like no other! —

My lords, I have read in books that astronomical observations are supposed to have shown most definitely that the sun moves with all planets and comets around a *central sun* unknown by us until now. What do you think of this matter?

"The opinion, which one probably cherished in the past, that our sun together with all its planets and comets itself rotates around a self-luminous or dark central body, like Jupiter and Saturn together with their satellites around the sun, belongs only in the realm of *mythical hypotheses*." (Müller, 246; Mädler, 440)

56. So not everything that you astronomers pretend is eternal truth. — Then are the *fixed stars* indeed stationary stars which never change their place in the heavens?

"That is not the case, although the shifts belonging here are so small that they reach a considerable size only after the course of centuries and can be proved in shorter periods only by observations of the utmost accuracy. — — — After 3000 years, around 20 stars will have moved more than 1° from their current position." (Müller, 237–238)

57. But according to your conviction, the sun is immovably firm?

"It is most likely that the common motion of the various fixed stars stems from a *motion of our sun* occurring in the opposite direction. According to W. Herschel's determinations, the point toward which our sun *moves together with all planets and comets orbiting it,* lies close to the constellation of Hercules. *If we now assume* (!) that our solar system rotates *with all differently distant fixed stars* around a common center of gravity, *then it is clear* (!!) that the center of these circular movements must lie 90° away from that focus, toward which our solar system moves. Mädler looks for the focus in the Pleiades cluster. (pp. 447 ff.)" (Müller, 245–246)

58. Sir Littrow, what do you think of the motion of the sun?

"Since the sun is the cause of the movement by the attraction its mass expresses on the planets — so also each of these planets, whose mass likewise expresses an attractive force on all remaining bodies, will *have to* react again to the sun *and give it a movement in space*. As the planet, namely by the attraction of the sun, describes an ellipse around it, so *also the center of the sun*, by the attraction of the planet set in motion, will *go along in an ellipse*. Only the circumference of this sun-ellipse will behave close to that of the planet like the masses of the two celestial bodies; or the sun-ellipse, because of the incomparably greater mass of the sun, will be *uncommonly small* against the ellipse of the planet." (Littrow, 274)

59. But, Sir Littrow, then one must of course assume that every planet sets the sun in motion?

"Since what is said here of a planet *is likewise true of all others*, the orbit which the center of the sun describes will be *a very intricate curved line*!" (Littrow, 274)

60. And this, my lords, you call astronomy? I mean, these are quite childish dreams!

"The existence of this movement of the sun is not to be doubted further — for the cited and hopefully *good and evident reason to everybody*!!" (Littrow, 274)

61. Well, the reason is not evident to me! Is there yet another movement of the sun?

"The *rotation* of the sun itself — its existence follows directly from the observed movements of sunspots." (Littrow, 274)

62. Can one see the surface of the sun exactly through good telescopes?

"On the sun all details remain hidden to us, which one would not be able to present on a globe of ⅛ inch diameter." (Bessel, 71)

63. Can you then recognize the surface of the planets exactly?

"We only see as much detail on Jupiter as a globe the size of a pinhead would be able to contain." (Bessel, 71)

64. What purpose do such estimates serve?

“These estimates are suitable for illustrating what our telescopes are capable of doing at such great distances; they are made too favorable rather than too unfavorable to the telescopes.” (Bessel, 71)

65. What is known about the surface of Ceres, Pallas, Juno, and Vesta?

“We can notice nothing about the new planets *Ceres*, *Pallas*, *Juno*, and *Vesta* except that they are present; they are indistinguishable from small fixed stars in the best microscopes.” (Bessel, 88)

66. Then are Jupiter, Saturn, and Uranus known in more detail?

“About *Jupiter*, on which all of Europe would become visible only as a dot, we can understandably recognize nothing detailed. We do not know how to gain any meaning from its surrounding wide belts. With *Saturn* we are even worse off, since it is once again as distant as its predecessor, *Uranus*, is once again far away.” (Bessel, 88–89)

67. Are Mercury and the newer planets known in more detail?

“We read (namely in astronomical books) of dark bands on Mercury, from which the speed of the winds of this planet has been derived. We read of visible haze circles which surround the new planets and make them intermediates between solid planets and airy comets. Of the one as little as of the other have I ever seen something, and hence I must leave it to each person whether he wants to believe in the wind and the haze.” (Bessel, 86)

68. How much time does Venus need for its axis rotation?

“Some faintly hazy spots were noticed on the vividly shining surface of Venus, and from their change of place the time of the axis rotation, or the length of day on Venus, has been inferred. How indeterminate the perception must have been, however, is evident from the fact that it is not yet known which of two indications of the length of day, 24 *days* and 24 *hours*, is the correct one.” (Bessel, 87)

69. I have heard that different parts of the earth's surface have been measured exactly. Have these measurements, then, revealed that the earth really has the shape of a somewhat flattened sphere?

"Most of these more recent undertakings (degree measurements) have been carried out with the utmost care. — But the main result that came out of them is *that no regular figure of the earth can be given* which explains all these measurements at the same time: there remain differences whose explanation can be sought nowhere else than in irregularities in the figure of the earth itself. — Now we know and have attained the full conviction that even by perfectly sharp observations nothing else can be obtained than the knowledge of the curvature *of a part* of an *irregular* body." (Bessel, 57–58)

70. Then what is the situation with regard to the calculation of the eclipses? Does one assume that the moon moves in a circle around the earth, or does one calculate according to the wave-shaped orbit, which it must have according to the Copernican system?

"One may allow himself *to consider the earth as resting in relation to the moon* and to transfer to the latter both movements, and this will also be consistently done in the following." (Mädler, 156–157)

71. Does the moon really exist to rule the night, as Scripture says?

"It is usually believed that the moon only exists for the earth, namely for the illumination of its powers. If nature had indeed had this intention, it would have achieved this very easily if the moon at the very moment of its origin had been a full moon or opposite the sun, specifically at a distance from the earth that would have been close to the hundredth part of the distance of the earth from the sun, and if at that time the speed of the moon had likewise been the hundredth part of the speed of the sun. For then the moon would have always stood directly opposite the sun, or always remained in the full moon; and even the eclipses, which now sometimes rob us of its view, would no longer have taken place at this distance. But so that it could reflect in a nearly four times larger distance even as much light in the full moon, as now, on the earth, its surface would have had to be enlarged just as many times. Since, however, the Author has not chosen this simple means, which alone leads to that purpose, and the moon hardly illuminates half of our nights, therefore we must presuppose that He also did not want to achieve this purpose, and that it therefore cannot have been His intention to place the moon only for us, or to make it the torchbearer of the earth." (Littrow, 198)

Well, how much the astronomers still don't know! But it seems to me, as if there were very little actual knowledge, but all the more that consists only in assertions, opinions, and dreams! Thereby you lords appear with an audacity and with a condemnation of others, as though you really had proof of your assertions. *And yet you have* ***not even one*** *piece of evidence*!! It is all uncertain, doubtful, and contradictory to each other!

I, however, praise the old *Johann Leonhard Rost*. He was also a lover of the Copernican system, but he said in his *Astronomie* (Nürnberg, 1723):

"Whoever, meanwhile, is so scrupulous, as if such (Copernican) hypothesis ran contrary to Holy Scripture, I myself want to give him the advice *to consider what he reads in God's Word as a perfect truth and prefer it to all human wisdom*; consequently, because the Copernican hypothesis is no article of faith in religion, he should accept or reject what seems arbitrary to his discretion. I am thus not of a mind to impose the Copernican and Keplerian principles on anyone. I rather leave each one his free will and dare to assure myself that he will learn so much of astronomy in this book, although he may profess the Tychonian or another hypothesis, that he should never regret the money and time he spends on it." —

But that is a completely different language than you newfangled lords use in your books! — And I must hold one more thing against you:

You have and know no living God,[16] and you do not think of giving Him honor. Rather, you are committing with your astronomy an idolatry as horrible as it is childish. But not even the idol receives honor, but only the idol manufacturers. You attach all honor to yourselves! You make the orbits of the world bodies according to your respective pleasures; you demand applause and faith for your word, but without having proved its truth!

Also here *Rost* is again a wholly different man. He says of astronomy (p. 5): "Through it we arrive most justifiably at the knowledge of God as the Creator of heaven and earth. The more we practice it, the more complete testimonies and arguments shine in our eyes that He is that Almighty and Most Wise Being whose glory the heavens tell. For when we perceive how the great and exceedingly beautiful world bodies, placed there by Him, still always perform their prescribed motions and definite courses unchanged in the most delicate order and the most complete correctness, then it becomes clear that such things cannot possibly stem from anything else than His wisdom, omnipotence, goodness, and providence, which we see before us through astronomy, as in a pure mirror; and from whose consideration we become encouraged to know and worship Him in the most agreeable manner." —[17]

So I want you astronomers to leave with your hypotheses and stay with *appearance*, with *experience*, and with the *Bible*, which of course explain everything well according to your own testimony. Before I should become suspicious of my Bible, and before I should credit my God with an untruth, you must at least first *bring a piece of evidence* that forces me to the conviction *that* ***only*** *your assertions can be true; the worldview of the Bible, however,* ***must*** *be false*! You still owe the *first* piece of evidence to the world!! —[18]

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[16] The Frenchman *Lalande* said, "I have explored the entire heavens; but a god I have not found there." (*Richer's Letters*, p. 12)

[17] Also *Kepler* was aware "that all research of the human spirit is vain if it is not blessed, directed, purified, and enlightened by the Spirit of God." Among other things he writes: "O You, who through the light of nature awaken in us the longing for the light of grace, in order to lead us by this to the light of glory, I thank You, Creator and Lord, that You delight me in Your creation and that I have rejoiced over the works of Your hands." (*Richer's Letters*, p. 12)

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[18] *G. Jahn* says in his excellent booklet, *Der gesunde Menschenverstand und die stillstehende Sonne zu Gideon*, p. 35: "The man could earn himself a nice piece of money, who could establish a truly incontrovertible proof of the movement of the earth. In England and France large prizes have been offered for such proof, but it will still be a good while before one will get around to taking them."